

What is claimed is:

1. An optical path control apparatus comprising:
a first substrate;
a second substrate movably provided for said
first substrate;
5 a mirror section provided on said second
substrate; and
a driving section which moves said second
substrate such that a first optical path of input
light to said mirror section is optically connected to
10 one of a plurality of second optical paths.

2. The optical path control apparatus according to
claim 1, wherein said driving section is a ultrasonic
wave generating source, and
said second substrate is moved by progressive
5 waves generated by said ultrasonic wave generating
source and is located on a position by standing waves,
and
said first optical path is optically connected to
said second optical path associated with said
10 position.

3. The optical path control apparatus according to
claim 1, wherein said driving section is a ultrasonic
wave generating source is a piezo-electric device.

4. The optical path control apparatus according to claim 1, wherein said driving section includes two electromagnets,

5 said second substrate is a permanent magnet provided between said two electromagnets,

5 said permanent magnet is moved between two positions based on magnetic polarities of said two electromagnets, and

10 said first optical path is optically connected to said second optical path associated with one of said positions.

5. The optical path control apparatus according to claim 1, wherein said second substrate has a gear shape, and said mirror section is provided on said second substrate via a base section,

5 said driving section has an electrostatic actuator, and rotates said second substrate based on force generated by said electrostatic actuator such that said mirror section is rotated, and

10 said first optical path is optically connected to said second optical path associated with a rotation angle of said mirror section.

6. The optical path control apparatus according to claim 1, wherein said second substrate has a micro

light wheel,

5 said driving section has lasers, and rotates said second substrate based on laser beams emitted by said lasers, and

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said first optical path is optically connected to said second optical path associated with a rotation angle of said mirror section.

7. The optical path control apparatus according to claim 1, wherein said second substrate is provided in a concave section of said first substrate, said concave section being filled with fluid;

5 said driving section moves said second substrate by supplying said fluid from one end of said concave section and absorbing said fluid from another end of said concave section,

10 said mirror section reflects said input light based on the movement of said second substrate such that said first optical path is optically connected to said second optical path.

8. The optical path control apparatus according to claim 1, wherein said mirror section is a thin film mirror.

9. The optical path control apparatus according to claim 1, wherein said mirror section is a lump type

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mirror.

10. An optical path control apparatus comprising:
a substrate; and

a mirror section which is provided on said
substrate and changes an optical path of reflection

5 light to input light by said mirror section in
response to an input signal.

11. The optical path control apparatus according to
claim 10, wherein said mirror section having two
mirror portions, each of which comprises:

5 a mirror layer provided as a surface layer; and
an underside layer provided under said mirror
layer and having a conductive line,

wherein said tow mirror portions attract or repel
each other based on current as said input signal
supplied to said conductive lines such that a
10 reflection angle of said mirror section is changed.

12. The optical path control apparatus according to
claim 10, wherein said mirror section comprises:

5 a mirror layer provided as a surface layer;
a transformed layer provided under said mirror
layer; and

an electrode layer provided under said
transformed layer,

wherein said mirror layer of said mirror section

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is transformed through transformation of said
10 transformed layer in response to supply of said input
signal such that a reflection angle of said mirror
section is changed.

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13. The optical path control apparatus according to
claim 10, wherein said mirror section having two
mirror portions, each of which comprises:

5 a mirror layer provided as a surface layer; and
a magnetic layer provided under said mirror
layer,

wherein said tow mirror portions attract or repel
each other through magnetization of said magnetic
layer based on said input signal such that a
10 reflection angle of said mirror section is changed.

14. The optical path control apparatus according to
claim 10, wherein said mirror section comprises:

5 a mirror layer provided as a surface layer;
a shape memory layer provided under said mirror
layer; and
a heating layer provided under said shape memory
layer,

wherein said mirror layer of said mirror section
is transformed due to transformation of said shape
10 memory layer through heating by said heating layer in
response to said input signal such that a reflection

angle of said mirror section is changed.

15. The optical path control apparatus according to claim 10, wherein said mirror section is a thin film mirror.

16. A method of manufacturing a mirror section comprising the steps of:

providing a die of semiconductor having a concave section;

5 forming a copper layer on a surface of said die;

forming a mirror film on said copper layer;

forming a transforming film on said mirror film; film to produce a laminate structure of said copper layer, said mirror film, and said transforming film;

10 transferring said laminate structure onto a base;

and

removing said copper layer to produce said mirror section on said base.

17. The method according to claim 16, wherein said step of forming said transforming film comprises the steps of:

forming a transformed film on said mirror film;

5 and

forming an electrode film on said transformed film.

18. The method according to claim 17, wherein said transformed film is formed of one of electric-distortion material, magnetic distortion material, and opto-magnetic distortion material.

19. The method according to claim 16, further comprising the steps of:

forming a resist layer on said mirror section;

forming an opening in said resist layer

5 corresponding to a tip portion of said mirror section; and

removing said tip portion of said mirror section.

20. A method of manufacturing a mirror section comprising the steps of:

forming a connection layer on a base;

locating a bump on said connection layer; and

5 pushing a die against said bump to produce a mirror section.

21. An optical path control apparatus comprising:

a first substrate;

a second substrate movably provided for said first substrate;

5 a mirror section provided over said first and second substrate; and

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a driving section which moves said second substrate such that a first optical path of input light to said mirror section is optically connected to 10 one of a plurality of second optical paths.

22. An optical path control apparatus comprising:
a thermal transforming cell;
a mirror section provided on said thermal transforming cell; and
5 a heating section which heats said thermal transforming cell.

23. A method of switching an output optical path comprising the steps of:
reflecting input light on an input optical path onto a first output optical path by a mirror section;
5 moving or transforming said mirror section; and
optically connecting said input light to a second output optical path through the movement or transformation of said mirror section.

24. The method according to claim 23, wherein said step of moving or transforming said mirror section is achieved by one of electrostatic force, magnetic force, force generated by ultrasonic waves, optical 5 force generated by laser beam, pressure of fluid, and mechanical force.